BOOK REVIEWS

TIME'S ARROW AND EVOLUTION. By Harold F. Blum. Princeton, The Princeton University Press, 1951. xi + 222 pp. $4.00.

Dr. Blum's main thesis in this small volume is that from the origin of life, evolution has proceeded necessarily along certain channels, predetermined from without by the physical nature of the inorganic earth and by thermodynamic considerations from within. His interpretation of the free energy changes in biochemical reactions is particularly lucid. The exposition draws freely from the disciplines of cosmogony, physical and photochemistry, to name a few. There is no denial of the importance of natural selection as an evolutionary force, but rather a setting of limits within which this force may operate.

The title suggests an attempt at explanation of the mechanism of evolution on the basis of the second law of thermodynamics. No such explanation is presented. However, the ghost of "living systems being a contradiction of the second law" is forcefully laid by emphasizing the requirement of a closed system for measurements. The living organism is not a closed system, nor is the earth which it inhabits. In order for life to constitute a violation of this law, it must be proven that the local decrease in entropy in the living thing is not compensated for by greater increases elsewhere in the same system.

The text in general is clearly written and self-explanatory, demanding little technical training of the reader. Particularly stimulating are the chapters entitled, "The Fitness of the Environment" and "The Origin of Life."

W. P. McN.

MYCOTROPHY IN PLANTS. By A. P. Kelley. Waltham, Mass., Chronica Botanica Company, 1950. xiv + 223 pp. $4.50.

This book takes the form of twelve lectures on the subject of the symbiotic associations of fungi and the various groups of terrestrial plants. It is actually a review article on the topic, covering the literature from the beginning of the nineteenth century to about 1940. It is not surprising to find that most of the book is devoted to the subject of mycorrhizae, or root-fungus associations, for this aspect of mycotrophy has received a great deal of attention from plant scientists because of its importance in forestry as well as physiology.

The lectures (or chapters) include discussions of the rise of the study of mycotrophy, the taxonomic ranges of both the host plants and the fungal endophytes, the wide geographical occurrence of mycotrophy, the relation of mycotrophic plants to their environment, the morphology of mycorrhizae, and the theories of the physiological significance of mycorrhizae. The author points out that little experimental work has been done on mycorrhizal physiology; in the preface he makes reference to a few recent (1949) papers which describe an approach to the problem through the use of radioactive elements as tracers. Since the publication of the book, several more such papers have appeared and may mark the beginning of a serious attempt to solve the problems involved. If this is the case, one may hope that a new chapter will soon be necessary.

Obviously the book has not been designed as an introduction to the subject of mycotrophy; the author assumes that the reader is familiar with